Syllabus of Machine Learning

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Goal

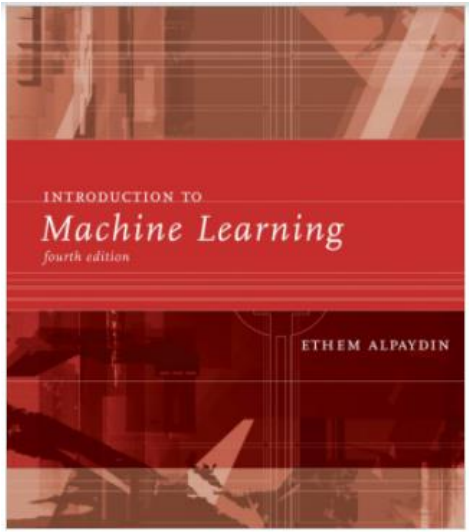
- Learn the basic knowledge and implementation techniques of machine learning.
  - Supervised Learning
  - Unsupervised Learning
  - Reinforcement Learning
- Create a wonderful final project so you can tell your son(s)/daughter(s), this is your project.
  - Make contributions on what you care

Prerequisite

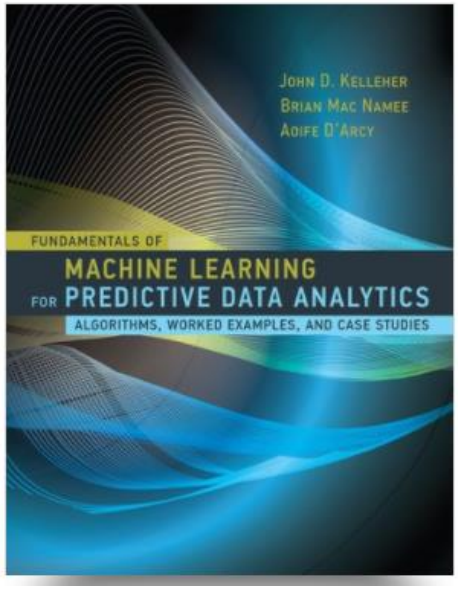
- Basic python programming ability
- Data structure
- Algorithms

Books

- Introduction to Machine Learning, Fourth Edition
  - Ethem Alpaydin



- Fundamentals of Machine Learning for Predictive Data Analytics
  - John D. Kelleher, Brian Mac Namee, Aoife D'Arcy



Slides

- Portal system

Roll call and Participation

- Zuvio
- Finish roll call before 9:20 a.m.

Syllabus

週次	上課日期	課程主題	內容
1	2月27日	說明課程	
2	3月6日	機器學習與競賽簡介	機器學習課程與競賽內容簡介
3	3月13日	機器學習基礎概念	機器學習基礎概念介紹 (矩陣、線性代數、微積分等)
4	3月20日	學習模型	何謂監督式學習、非監督式學習、半監督式學習與強化式學習
5	3月27日	迴歸	線性迴歸與羅吉斯迴歸
6	4月3日	最佳化模型：梯度下降與正規化	梯度下降法、隨機梯度下降法、小批次梯度下降法、Normal Equation的正規化、羅吉斯迴歸的正規化
7	4月10日	口頭報告提案投影片 競賽能力介紹	提案申請書撰寫介紹、投影片製作邏輯介紹、 口頭報告技巧介紹
8	4月17日	資料處理技術介紹	資料處理技術(資料分析常用的函式庫介紹、Numpy的基礎、Pandas的基礎、資料前處理)
9	4月24日	期中考	
10	5月1日	分群模型	決策邊界、貝氏分類器、支持向量機、決策樹、隨機森林、K-means演算法、K-近鄰演算法
11	5月8日	資料分析應用範例實作	以鐵達尼號生存預測為範例題目，從資料前處理到建置模型實作教學
12	5月15日	深度學習模型-DNN	DNN模型概念介紹
13	5月22日	深度學習模型-CNN	CNN模型概念介紹
14	5月29日	深度學習模型實作-DNN與CNN	DNN與CNN實作教學
15	6月5日	深度學習模型實作-物件辨識	物件辨識YOLO模型實作教學
16	6月12日	深度學習模型-RNN	RNN模型概念介紹
17	6月19日	期末專題報告 (1)	由學生報告期末專題，可以以競賽的作品內容為主題進行報告
18	6月26日	期末專題報告 (2)	

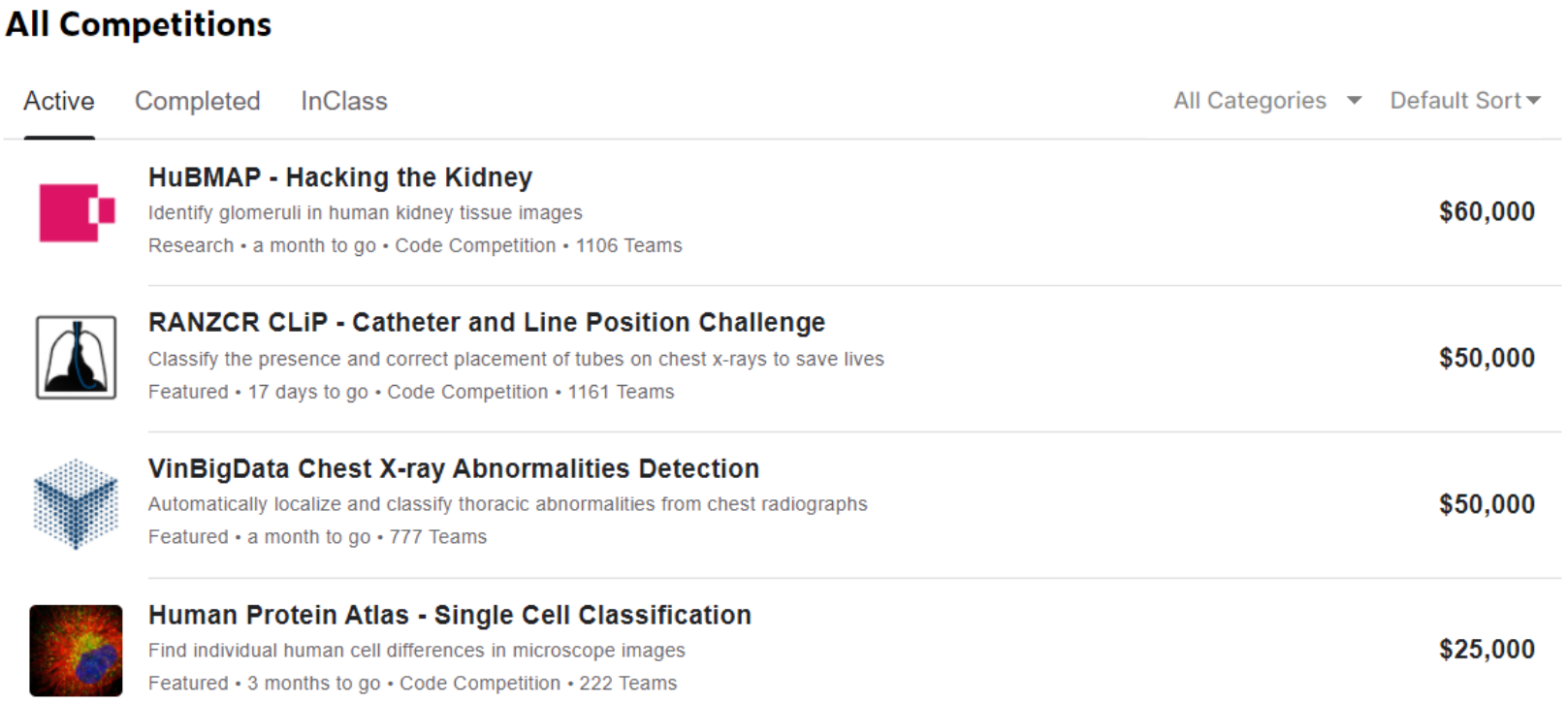
Join Competition

- To improve your skill of data analytics, you have to choose one of the competitions to join:
- Practice your data analytics skill : Kaggle/Aidea
- Using data to create a service: 資料創新競賽
- Help Industry solve the problem: AIGO

- Of course, you can join all competitions.

Kaggle

- https://www.kaggle.com/competitions



AIdea

- https://aidea-web.tw/about

資料創新競賽

- https://opendata-contest.tca.org.tw/

AIGO

- https://aigo.org.tw/zh-tw/competitions

中揚光電

多樣性物料設備AI 取料分析優化

由我司自製開發物管設備，進行AI分析取料並加速取料流程，將內部放置物依據MES特殊需求，以AI提示推薦該次應使用的刀具或製具，並透過圖號及刀號這些資料訓練演算法，提高人員倉庫加工製程上的效率，與自我判斷排序整理模

593 隊伍申請：0-3 歡迎投件

台塑旭

彈性纖維橫斷面外觀AI品質辨識

目前彈性纖維橫斷面品質檢測是以顯微鏡放大顯像於螢幕上，以人工目視計算纖維條數後，再以尺規量測螢幕上之纖維直徑是否於管制範圍，整廠平均每天約有300張橫斷面影像需藉由上述方法以人工判讀，非常耗費人力及時間。本案

779 隊伍申請：0-3 歡迎投件

Lab and HW

- Please hand in Lab and HW on time.
- If you submit your homework late within 7 days, you will only get 85% of your score.
- If you submit your homework late within 14 days, you will only get 70% of your score.
- If you submit your homework late more than 14 days, you will get 0.

Grades

- **Lab and HW (35%):** 5% each for Labs
- **Proposal and First presentation (7%)**
- **Midterm (20%)**
- **Quiz (3%):** randomly happens, 1 pts each
- **Final project (35%)**
- **Bonus : Off-campus competition (Up to 10 points.)**
  - When you join more than one competitions and you don’ t win the prize, you can get registration point and final contest point.
    - +1: Registration (Except Aidea.)
    - +2: Final Contest
  - +10: Award (1st prize)
  - +8: Award (2st prize)
  - +6: Award (3rd prize)
  - +4: Other prize

Final Project

Important Information

- Abstract (After midterm)
- Presentation (Slides and 2-min video)
- Report (English/Chinese)

Final Project Grade

- Abstract & Report (25%)
- Presentation score (20%-ranked by peers)
- Originality (15%)
- Performance (20%)
- 2-min video (20%)
- 10, 7, and 3 extra pts for the 1st, 2nd, and 3rd place of Most Popular Award (MPA), respectively

- Notice that the average scores BEFORE adding bonus for each project will be adjusted to approximately the same value.

Final Project Report

- A 5-page document describing your:
  - Motivation
  - Goal
  - State-of-the-art
  - Proposed Architecture and Methods
    - Uniqueness and Novelty
  - Dataset
  - Experiment Results/Interface
  - Conclusion
  - The job assignments between members
- Not include cover.
- Show that your ideas are worth efforts.

About the 2-min video

- Let viewers understand the novelty and contribution easily
- Target audience: non-ECE bachelor students
  - Please DO NOT stuff the video with technical terms
- An example: Please refer to the videos
- https://www.youtube.com/watch?time_continue=97&v=G-omu_ki7YM
- https://www.youtube.com/watch?v=hUnRCxnydCc

Spotlight Video List (1/2)

[1] RL for dodging game: https://youtu.be/4oz-mUb4Dgk
[2] Arrhythmia detection using 12 lead ECG based on Deep Learning: https://youtu.be/ZNf5X_f1CBo
[3] DeepFont: Identify Your Font from An Image: https://youtu.be/WRzvHUN6aMQ
[4] Intelligent Fault Detection of Rolling-Element Bearing with Deep Learning: https://youtu.be/WzKL3XS6pkQ
[5] Short Text Understanding Through Lexical Semantic Analysis for Keyword Search: https://youtu.be/c0e4luqp3rE

Spotlight Video List (2/2)

[6] Dope Learning: A Computational Approach to Rap Lyrics Generation: https://youtu.be/ghvE6JLVi08
[7] How FER makes money?: https://youtu.be/grT_-0Yc_mE
[8] Deep Recurrent Q-Learning for Partially Observable MDPs: https://youtu.be/zhrFWtADUo0
[9] Product recommendation with face recognition: https://youtu.be/bf0609NDQYM
[10] Deep Learning for Event-Driven Stock Prediction: https://youtu.be/cgyurMRSBuA
[11] Self-driving cars Simulation with EANN: https://youtu.be/1tUFju-aoj8
[12] Hate Speech Writer Mapper based on Political Views Motive: https://youtu.be/I87G5USDJg4
[13] Beautification: https://youtu.be/p78Y5tC2rUg

Should I take?

Pros	Cons
Familiar with Machine Learning	Heavy?
Your Own Final Projects	Exhausted?
Participation	Pop Quiz
Lab	Programing

Quiz, homework, project, please…

- Do not copy the others' homework
- Write your own code, please
- In project, please:
  - Work as a team
  - Contribute your ideas
  - Implement your part
  - Do join the discussions
- You can always come knock my door
  - I would be glad to help you

Questions